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**Abida Mangi**  
Department of Zoology, Shah  
Abdul Latif University Khairpur  
Sindh Pakistan

**Zaibun-nisa Memon**  
Department of Zoology, Shah  
Abdul Latif University Khairpur  
Sindh Pakistan

## Analysis of gut contents of Common carp (*Cyprinus carpio*) in district Larkana, Sindh, Pakistan

**Abida Mangi and Zaibun-nisa Memon**

### Abstract

Common carp (*Cyprinus carpio*) was introduced from Thailand to Pakistan for the purpose of aquaculture. This study was conducted in district Larkana, Sindh, Pakistan from January to December 2015. A total of 66 common carp were collected from different fishponds of Larkana. The month-wise collection and experiments were performed to show the seasonal changes in food choice, and feeding habits of the fish. Out of 66 guts, 48 (72.7%) were with considerable amount of food (full) and 16(24.2%) were with negligible amount of food (empty). It was observed that the highest percentage of fullness of the gut was found in the month of August, September and October (100%) and the lowest percentage of fullness was found in January 2(28.6%). The highest percentage of emptiness of the guts were found in January 5(71.4%) and the lowest percentage of emptiness of guts in August, September, October (0.0%). The gut contents were analysed to confirm their food habits, it was found that the food of fish consists of aquatic plants (24 %), molluscs (21 %), insects (20 %) sand, mud, debris (19 %) and miscellaneous (16 %). The study of fish revealed that fish consumed more food in the summer months and less in the winter months. It was concluded that the common carp was omnivorous in its feeding with considerable seasonal variations.

**Keywords:** *Cyprinus carpio*, food contents, feeding habits, seasonal variation, aquatic plants

### 1. Introduction

Common carp (*Cyprinus carpio*) belongs to the class Osteichthyes (bony fishes) order Cypriniformes and the family Cyprinidae. The family Cyprinidae is one of the most important families of fish distributed throughout the world in almost every kind of waters; such as lakes, streams, rivers and pools [1-3]. It was brought from Thailand in 1964 and was introduced in both inland and captive waters of Pakistan [4]. The common carp (*Cyprinus carpio* L. 1758) is locally known as Gulfam characterized by large and shiny scales [5]. It is a freshwater fish widely distributed in eutrophic waters of Europe and Asia [6]. Common carp had heavy an elongated body and somewhat compressed, thick lips, two barbels on each side of the upper lip, with the posterior pair more conspicuous; relatively small, toothless mouth, with the upper jaw slightly protruding, one long dorsal fin with soft rays [7].

Common carp is frequently cultured and are of great commercial value as a fish for food both over their native and introduced range [8].

Common carp (*Cyprinus carpio*) is one of the most commercially important and widely cultivated freshwater fish in the world [9, 10], contributing to 11% of the total world freshwater aquaculture production [11]. More than 90% of this production comes from Asia [11], where common carp is cultured in various pond aquaculture systems.

The species is an omnivorous and bottom feeder fish. Since it disturbs the bottom sediments while feeding, it is also known to increase water turbidity and the availability of benthic organisms, sand, mud and detritus in its digestive tract throughout the year confirms that the species feeds at the bottom of the water body [12, 13]. Due to omnivorous habit this species is strongly recommended for domestic culture and because of the fact that it's all varieties breed freely throughout the year in confined waters [13]. The success of good scientific planning and management of different fish species largely depends on the knowledge of their biological aspects in which food and feeding habits include a valuable portion. Nutrition of fish is directly related to the quantity of fish produced [13].

The growth of a fish is influenced by the quality and quantity of natural food materials available and consumed [14]. Thus, any variation in quality and quantity of food materials will

### Correspondence

**Abida Mangi**  
Department of Zoology, Shah  
Abdul Latif University Khairpur  
Sindh Pakistan

affect growth rate of the fish. The qualitative and quantitative variations of natural food materials in a water body are under the influence of several biotic and abiotic factors<sup>[14]</sup>. The food habit of different fish varies from month to month. This variation is due to changes in the composition of food organisms occurring at different seasons of the year<sup>[14]</sup>. The food and feeding habits of fish change with the time of the day, season, size of fish, different ecological factors and various food substances available in the water body<sup>[15]</sup>. The present investigation was designed to explore gut contents of Common carp (*Cyprinus carpio*) in district Larkana, Sindh, Pakistan.

## 2. Materials and Methods

A total of 66 common carps were collected monthly from different fishponds of the District Larkana from January to December 2015. The collected fish samples were brought to the laboratory of the Department of Zoology for dissection and identification of food contents of selected fish, i.e. *Cyprinus carpio*. The experiments were performed to show the seasonal variation in food choice of the fish. The stomach of the fishes were dissected with the help of a simple scissors and the stomach contents were taken in a petridish and the food items were identified by (Magnification 5X, 10X) and the various items were examined and sorted out under the dissecting microscope and thus identified. Gut contents were analysed using the Points Method. In this method each food item was allotted in a certain number of points in relation to its estimated contribution to gut volume and the summations of the all points for each food item of the gut are reduced to percentages to show the percentage composition of the diet<sup>[15-19]</sup>.

## 3. Results and Discussion

The *Cyprinus carpio* is omnivorous in nature and mainly fed on insects, molluscs, aquatic plants, mud and sand. The seasonal feeding intensity percentage of fullness, percentage occurrence of food items were observed in the present study are shown in Table 1 Fig 1 and Table 2. Out of 66 guts, 48(72.7 %) were with considerable amount of food and 18(27.3%) were with negligible amount of food. It was observed that the highest percentage of fullness of the gut was found in the month of August, September and October (100%). Afterwards the percentage of fullness was found to decrease gradually and became the minimum in January 2(28.6%) in (Table 2 and Fig-2). The highest percentage of emptiness of the stomachs was found in January 5 (71.4). After months the percentage of emptiness gradually decreased and the lowest percentage of emptiness was found in the month of August, September and October (0.0%) in (Table 2 and Fig 2). The different food items found in the gut of *Cyprinus carpio* in different months were aquatic plants (24.0 %) molluscs (21.0 %) insects (20.0%) sand, mud and debris (19.0%) and miscellaneous (16.0) in Fig- 3.

Leaves and stems of aquatic plant parts were found in the

stomach contents of *Cyprinus carpio*. The highest percentage of plant parts occurred in June(33.3%) and the lowest in April (11.1) in table-2. The highest percentage of molluscs were recorded in the month of August (36.8%) and lowest in December (19.0%). The highest percentage of insects was noticed in the month of November (33.3%) and lowest in January (0.0 %). The maximum quantity of sand, mud and debris was recorded in the month of January (40.0 %) and the lowest in November (9.5%). The highest percentage of miscellaneous occurred in December (21.4%) and the lowest in April (10.5%) in table-3. The *Cyprinus carpio* analysis on gut contents was also observed as 35% by Pillay<sup>[16]</sup>. The food and feeding habits of exotic *Cyprinus carpio* Var. communis was resulted on an average basis, detritus formed 43.5% of total food, while the remaining food (56.5%) consisted of plant (31.21%) and animal matter (25.29%). The fish was designated as detri-omnivore with bottom feeding habit. Gastrostatic index (Ga. S.I.) recorded its highest value during July (6.28), while lowest value was recorded in February (3.34).The index remained generally high during the warmer months, followed by a gradual decline with the approach of winter<sup>[20]</sup>. The animal food contributed of protozoans, rotifers, zooplankters, insect adults, insect remains, fish scales, fish eggs etc., and plant food consisted of green algae, diatoms, macrophytes, besides some amount of detritus and sand. The gut contents of *Schizothorax esocinus* consisted of 63.5% of plant matter and 30.5% of animal matter<sup>[21]</sup>. On an average diet of *Schizothorax curvifrons* was composed of dissolved organic matter (40.33%), sand and mud (17.51%), phytoplankton (38.78%), zooplankton (2.00%) and miscellaneous matter (1.38%)<sup>[22, 23]</sup>. It was found that natural food material is not present in equal quantity throughout the year, and there is a clear fluctuation in it. The study of fish also showed that fish consumed more food in the summer months and less in the winter months. The results of the present study would be beneficial for future development of culture techniques of this species in ponds for aquaculture.

**Table 1:** Total No. of fullness and emptiness of gut of *Cyprinus carpio* from January to December 2015.

Month	No. of examined fish	No. of fullness	No. of emptiness
January	7	2	5
February	6	4	2
March	7	5	2
April	4	3	1
May	5	4	1
June	5	4	1
July	7	5	2
August	5	5	0
September	6	6	0
October	4	4	0
November	5	3	2
December	5	3	2
Month	66	48	18

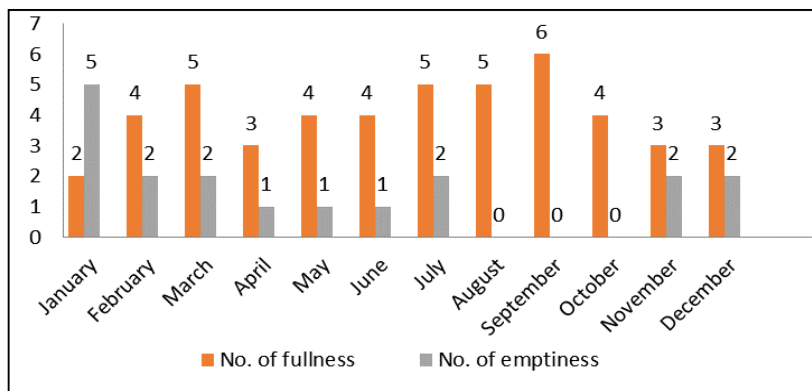


Fig 1: Total No. of full and empty gut of *Cyprinus carpio* from January to December 2015

Table 2: Monthly percentage of fullness and emptiness of gut of *Cyprinus carpio* from January to December 2015

Month	No. of examined fish	Fullness %	Emptiness %
January	7	28.6	71.4
February	6	66.6	33.3
March	7	71.4	28.5
April	4	75.0	25.0
May	5	80.0	20.0
June	5	80.0	20.0
July	7	71.4	28.5
August	5	100	0.0
September	6	100	0.0
October	4	100	0.0
November	5	60.0	40.0
December	5	60.0	40.0
Total	66	72.7	24.2

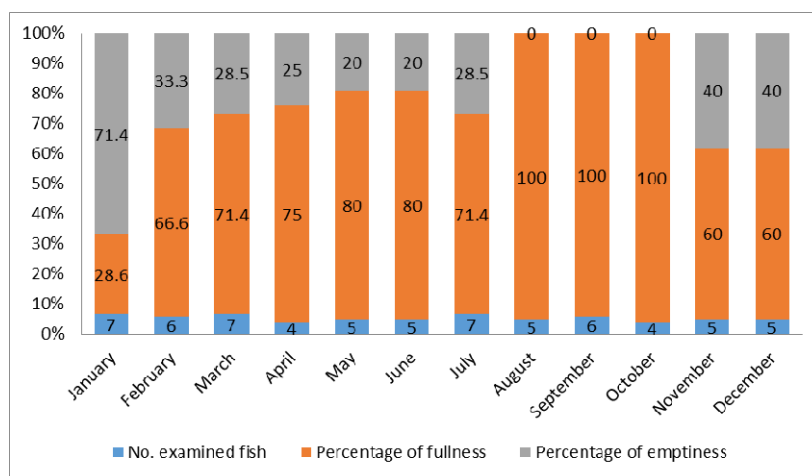
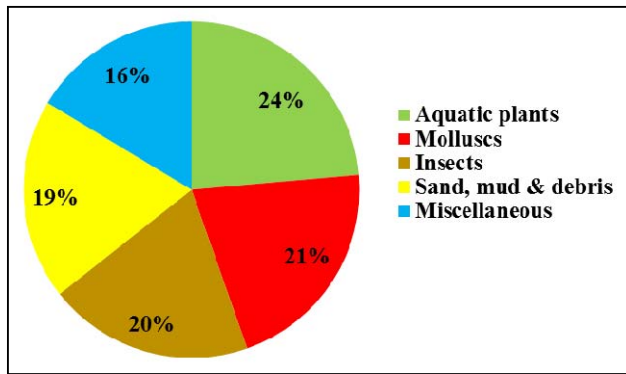


Fig 2: Overall monthly percentage of fullness and emptiness of stomach of *Cyprinus carpio* from January to December 2015

Table 3: Monthly percentage of food items found in the gut of *Cyprinus carpio* from January to December 2015

Months	Aquatic plants %	Molluscs %	Insects %	Sand, mud & debris %	Miscellaneous %
January	(20.0)	(20.0)	(0.0)	(40.0)	(20.0)
February	(30.0)	(20.0)	(10.0)	(20.0)	(20.0)
March	(20.0)	(20.0)	(26.6)	(13.4)	(20.0)
April	(11.1)	(22.2)	(33.2)	(16.6)	(16.6)
May	(30.4)	(13.0)	(17.3)	(21.7)	(17.3)
June	(33.3)	(26.6)	(6.6)	(13.3)	(20.0)
July	(24.0)	(20.0)	(16.0)	(28.0)	(12.0)
August	(15.7)	(36.8)	(21.0)	(15.7)	(10.5)
September	(28.5)	(21.4)	(9.5)	(23.8)	(19.0)
October	(20.0)	(24.0)	(28.0)	(16.0)	(12.0)
November	(19.0)	(23.8)	(33.3)	(9.5)	(14.2)
December	(28.5)	(19.0)	(7.1)	(21.4)	(21.4)



**Fig 3:** Overall percentage of food items found in the gut of *Cyprinus carpio* from January to December 2015

#### 4. Conclusion

From the above findings it is concluded that feeding behaviour of *Cyprinus carpio* is very essential to note in order to increase its production. It will help out the economic growth of the country.

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